Loon Lake Rehabilitation Project
Draft Environmental Assessment

MONTANA FISH, WILDLIFE & PARKS
FISHERIES DIVISION

July 31, 2007

Draft environmental assessment for the application of piscicide to Loon Lake and the associated outlet tributary for the purpose of removing eastern brook trout and black bullheads, and restocking with westslope cutthroat trout.

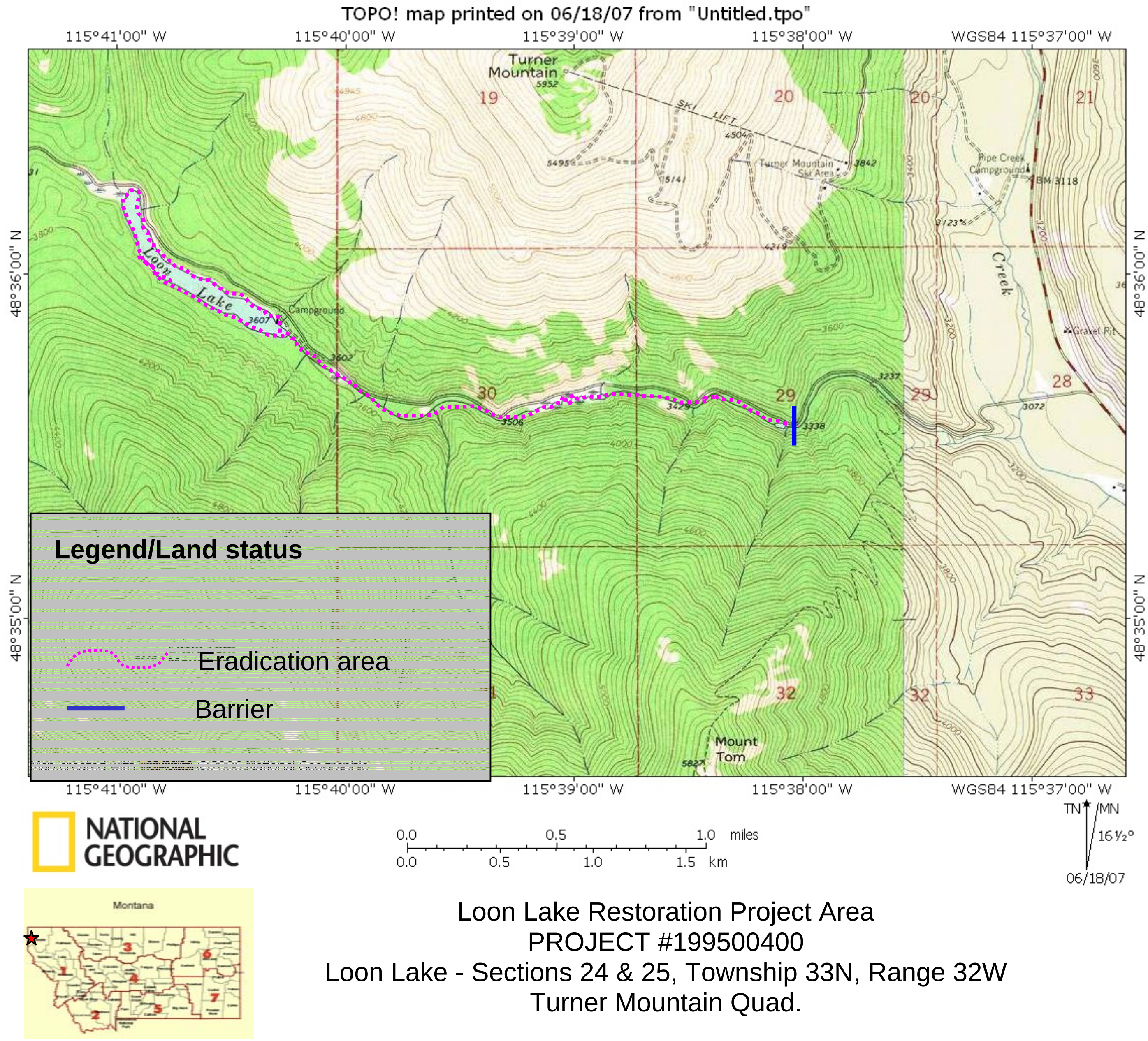
PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: Restore native fish and improve angling quality of Loon Lake through removal of black bullheads (*Ameiurus melas*) and eastern brook trout (*Salvelinus fontanalis*) by applying the piscicide rotenone and restocking the lake with native westslope cutthroat trout (*Oncorhynchus clarkii lewisii).*

B. Agency Authority for the Proposed Action: Montana Fish, Wildlife & Parks (MFWP) "…is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects…" under Statute 87-1-702.

C. Estimated Commencement Date: It would commence in late August or early September 2007. MFWP anticipates that a single application of the piscicide rotenone to Loon Lake and the outlet stream may not be completely effective at removing the present fish community within this system due to the resilient nature of black bullheads and spring activity within the lake. Therefore, the lake may require two piscicide applications. If needed, the second piscicide application would occur in either early spring or fall of 2008.

This project is referred to as the Loon Lake Restoration Project, and the purpose of the project is to remove eastern brook trout and black bullheads from the lake and outlet stream and restock the lake with westslope cutthroat trout. The bull trout population in Pipe Creek would also benefit from the removal of eastern brook trout by eliminating a source of introgression. Hybridization between bull trout and eastern brook trout is a problem in Pipe creek. This project would be conducted on Loon Lake and the associated unnamed outlet tributary to Loon Lake, located approximately 15 miles northwest of the city of Libby, Montana. Specifically, the project is located within Township 33 North, Range 32 West, Sections 24 and 25, Lincoln County, Montana (Figure 1), Latitude 48 degrees 35.99 minutes North, Longitude 115 degrees 40.73 minutes West. The US Forest Service owns and manages all the property where the proposed activities would occur.



Loon Lake Restoration Project Area
PROJECT #199500400
Loon Lake - Sections 24 & 25, Township 33N, Range 32W
Turner Mountain Quad.

Figure 1. Location of Loon Lake, located approximately 15 miles northwest of Libby, Montana.

D. Project Size (acres affected):

Loon Lake is 33 acres in size and has a maximum depth of 25 feet. The unnamed tributary outlet stream to Loon Lake is the only surface water that exits Loon Lake. This stream flows approximately 3 miles before entering Pipe Creek. Ground water and three seasonally intermittent streams feed Loon Lake from the northeast.

E. Project Size (acres affected):

1. Developed/Residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian – Loon Lake is 33 acres in size and has a maximum depth of 25 feet. The unnamed outlet stream flows out of the lake, and the discharge of the creek was measured in June 11, 2007, at 0.71 cubic feet per second (cfs). The substantial sources of water to Loon Lake are ground water and three seasonally intermittent streams that enter the lake from the northeast.
5. Floodplain – 0 acres
6. Irrigated Cropland – 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres

F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action:

Background

Loon Lake is located approximately 15 miles northwest of Libby, Montana, and is accessed from the Pipe Creek Road. The lake has a surface area of 33 acres and a maximum depth of 25 feet. Loon Lake is fed by ground water and three seasonally intermittent streams from the northeast. The unnamed outlet stream that leaves the lake is the only outlet stream for the lake and flows from the lake through public land (USFS) for about 3 miles to Pipe Creek. Westslope cutthroat trout were likely the dominant salmonid species historically present in Loon Lake. However, black bullheads were illegally planted in Loon Lake sometime after the late 1960s or early 1970s. MFWP also stocked rainbow trout in the 1930s, 1980s, and 1990s, arctic grayling in the 1930s and 1940s, and eastern brook trout from 1948-1961 on seven occasions. Currently, the only two species remaining in the lake are black bullheads and eastern brook trout.

Purpose

Brook trout and black bullheads occur at relatively low levels in Loon Lake, but at sufficiently high abundance to be self-sustaining. However, brook trout are relatively more abundant in the outlet stream than the lake. Angler use of the lake has also declined within recent years. In 1991, MFWP estimated that Loon Lake received 490 angler-days per year, but in 2003, angling pressure on Loon Lake dropped to 82 angler-days per year.

The objectives of this project are to increase the angling quality of Loon Lake and to reduce the number of brook trout entering Pipe Creek from Loon Lake and the outlet stream in order to aid the long-term persistence of bull trout in Pipe Creek for a period of at least 7-12 years by reducing the number of brook trout in Loon Lake and the outlet stream and black bullheads in Loon Lake by at least 90%.

Proposed Activities

MFWP would use a combination of piscicides to remove nonnative fish species from Loon Lake and the outlet stream. We propose to use CFT Legumine, a commercial formulation that contains 5% rotenone as the active ingredient, as the primary piscicide for this project to remove eastern brook trout and black bullheads from Loon Lake and the outlet stream downstream to the existing barrier on the outlet stream located approximately 1.0 mile upstream from the confluence with Pipe Creek. MFWP measured the discharge of the outlet stream on June 11, 2007, near the lake outlet determining the flow to be 0.71 cubic feet per second (cfs). Since the surface outflow substantially exceeds surface inflow into the lake, it is very likely that substantial areas of lake-bottom upwelling exist in Loon Lake. These upwelling areas may provide refuge areas for fish during the treatment. Therefore, MFWP would also use a dry rotenone gel formulation in conjunction with CFT Legumine at strategic upwelling locations within Loon Lake. Discharge measurements near the time of treatment would be performed to more accurately estimate the rates of upwelling in the lake. The dry rotenone formulation would be placed in the springs to repel fish and keep them from seeking refuge in the springs following the application of CFT Legumine to the lake. Dry rotenone is mixed with gelatin and sand into a dough-like consistency, then formed into ‘dough balls’ or placed in containers, such as burlap bags or plastic buckets with holes in them, and placed in the freshwater springs in the lake. This dry rotenone formulation would be placed directly in upwelling areas immediately prior to the body of the lake being treated with CFT Legumine. If needed, the second piscicide application would occur in either the spring or fall of 2008.

MFWP has a long history of using piscicides to manage fish populations in northwestern Montana. From 1948 through present, the department has completed over 130 rotenone projects for a variety of reasons, but principally to improve angling quality and less so for native fish conservation.

Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family including jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) that are found in Australia, Oceania, southern Asia, and South America. Native people have used rotenone for centuries to capture fish for food in areas where these plants are naturally found. It has been used in fisheries management in North America since the 1930s. Rotenone has also been used as a natural insecticide for gardening and to control ectoparasites such as lice on domestic livestock.

Rotenone acts by inhibiting oxygen transfer at the cellular level and is especially effective at low concentrations with fish because it is readily absorbed into the bloodstream through the thin cell layer of the gills. Mammals and other nongill-breathing organisms do not have this rapid route into the bloodstream and thus can tolerate exposure to concentrations much higher than that used to kill fish. In essence, most nontarget organisms are not impacted at fish-killing concentrations although aquatic insect and zooplankton numbers are drastically reduced during the first year following the application of the piscicide rotenone. Recovery occurs in 1 to 2 years (see comment 5C below for further discussion).

The boundaries for the proposed treatment area include the following water bodies: all of Loon Lake and that portion of the outlet stream where it leaves the lake to approximately 1.0 mile upstream from the confluence with Pipe Creek near the existing natural barrier. Loon Lake and the outlet stream would be treated with CFT Legumine brand 5% rotenone. We would follow the manufacturer's label recommendations for concentrations for normal lake use when treating the lake, which, for black bullheads, is 2-4 ppm. On-site bioassays using caged fish would determine the appropriate concentrations of CFT Legumine needed for this project; concentrations would not exceed those on the manufacturer's product labels. The manufacturer's label states that the persistence of the rotenone varies according to water temperatures, turbidity, sunlight intensity, alkalinity, etc. However, we believe the lake would be detoxified in approximately 6-12 weeks.

Although there is no domestic use of water from Loon Lake and its outlet stream, signs would be posted to warn people not to drink the water or to swim immediately after the application of rotenone.

The CFT Legumine would be dispensed in the lake by boat. Drip stations (containers which hold a measured amount of rotenone to provide the desired concentration and then filled with water to provide dilution and the proper delivery time to the target stream) and backpack sprayers may also be used to dispense the piscicide in the inlet channels to the lake and the outlet stream, marshy areas around the lake, and within the outlet stream downstream to the existing barrier. Rotenone concentrations in the outlet stream may remain at least 1 ppm to the barrier due to the higher concentration of rotenone applied to the lake. Thus, drip stations would likely be used only in tributaries to the outlet stream and inlet channels to the lake. They would be calibrated to deliver a rotenone concentration of 1 ppm.

A physical barrier on the outlet stream is needed in conjunction with this project in order to prevent or minimize nonnative fish species from colonizing the lake and outlet stream after applying the piscicide rotenone. The existing barrier on the outlet stream consists of several large boulders that cause the water to drop approximately 6 feet and would fulfill this objective. We would use potassium permanganate to detoxify the outlet stream near the existing barrier. We would determine the organic demand at several locations within the outlet stream and adjust the potassium permanganate concentrations to allow for demand and rotenone detoxification. In distilled water, potassium permanganate detoxifies rotenone at approximately a 1:1 ratio. Engstrom-Heg (1971, 1972) demonstrated through controlled experiments that dissolved electrolytes and suspended organic matter greatly influence the amount of potassium permanganate needed to neutralize rotenone. The organic demand tests would allow us to compensate for this when applying potassium permanganate to neutralize the rotenone below the barrier. If rotenone is applied to the lake at a concentration of 4 ppm and is still at that concentration when it reaches the detoxification station at the barrier, potassium permanganate would be applied at a concentration greater than 4 ppm to allow for organic demand although it is likely that the rotenone would degrade naturally to some degree by the time it reaches the detoxification station.

MFWP measured the discharge of the outlet stream near the lake outlet and at the Pipe Creek confluence and determined discharges to be 0.7 and 3.3 cfs, respectively. We also conducted a flow test using Fluorescein dye at the same time and determined that it takes approximately 100 minutes for water to flow from the barrier location site to the confluence at the observed discharge. However, MFWP would measure the discharge at these two locations at a point in time closer to applying the piscicide rotenone to account for seasonal water availability, and potassium permanganate would be applied at the rate specified on the manufacturer's (CFT Legumine) label, with adjustments in application rate, if needed, depending upon the results of the organic demand tests. However, we may also add potassium permanganate directly to Loon Lake in the event that the detoxification takes longer than anticipated. This would occur if air temperatures decrease to the point that ice cover on the lake is imminent. Potassium permanganate would be added, either by boat if accessible before ice cover or by drilling a series of regularly spaced holes through the ice and pumping a slurry of potassium permanganate into the lake, to accelerate the breakdown of the rotenone remaining in Loon Lake. In 2006, MFWP applied 5 ppm rotenone to Kilbrennan Lake, which is similar to Loon Lake morphologically and also contained black bullheads and eastern brook trout (along with yellow perch). The October 30 application of rotenone to Kilbrennan Lake resulted in an extended period of toxicity following ice formation on the lake. MFWP applied potassium permanganate through the ice in order to speed up the neutralization of the rotenone. Even so, the lake was not declared detoxified until March 9, 2007. Applying the piscicide rotenone to Loon Lake in late August or early September should decrease the detoxification time because rotenone degrades faster when exposed to sunlight and higher water temperatures. Although needing to apply potassium permanganate through the ice at Loon Lake is unlikely, MFWP would be prepared to do so if needed.

The duration of the application portion of the lake treatment would take approximately 8 hours; however, treated water would be flowing from the lake for an extended period of time. We would operate the detoxification station near the existing barrier until sentinel fish survive and show no signs of stress in the outlet stream for 4 hours as specified by the label.

A single application of rotenone may not kill all the fish within the project area due to the high resilience to rotenone of black bullheads and the abundant spring activity within the unnamed tributary and lake that would likely provide refugia for the brook trout and black bullheads. Therefore, this project will require rotenone applications to achieve a reduction of at least 90 percent of both species. After the first rotenone treatment to Loon Lake and the outlet stream, we would evaluate the effectiveness of the treatment via gillnetting and electrofishing surveys and use the information gathered from these surveys to evaluate the need for an additional treatment. If fish are captured and a second treatment is required, we would likely complete the second treatment in either the late spring or early fall of 2008.

PART II. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES Will the proposed action result in:	Impact Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil, which would reduce productivity or fertility?		X				
c. Destruction, covering, or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition, or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?		X				
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

2. **WATER** **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen, or turbidity?			X		Yes	2a.
b. Changes in drainage patterns or the rate amount of surface runoff?		X				
c. Alteration of the course or magnitude of floodwater or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water-related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f.
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		Yes	2a and 2f.
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?			X		Yes	2j.
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		Yes	2m.

Comment 2a. This project is designed to intentionally introduce CFT Legumine and powdered rotenone formulation to surface water to kill brook trout and black bullheads, as well as potassium permanganate ($KMnO_4$) as a means to deactivate the piscicides. The impacts from the additions of these chemicals to the water would be short term and minor.

CFT Legumine and powdered rotenone naturally break down quickly in the environment. Rotenone is a highly unstable compound and a variety of factors influence natural breakdown, including water chemistry, water temperature, exposure to organic substances, exposure to oxygen, and sunlight intensity (Ware 2002; ODFW 2002; Loeb and Engsrtom-Heg 1970; Engstrom-Heg 1972; Gilderhus et al. 1986). Rotenone persistence studies by Gilderhus et al. (1986) and Dawson et al. (1991) found that in cool water temperatures of 32 to 46°F the half-life ranged from 3.5 to 5.2 days. Gilderhus et al. (1986) reported that 30% mortality was experienced in rainbow trout exposed to degrading concentrations of actual rotenone (0.004 parts per million [ppm]) in 46°F pond water 14 days after a treatment. By day 18 the concentrations were sub-lethal to trout.

To minimize the effects on water quality and aquatic life and control the area affected so that it does not extend downstream in the outlet stream and Pipe Creek, CFT Legumine and a powdered rotenone formulation used for this project would be detoxified with potassium permanganate near the existing fish barrier. Potassium permanganate would be mixed with stream water using an electric auger to deliver potassium permanganate powder to the stream to produce a concentration of liquid sufficient to detoxify rotenone formulations (2-4 ppm). During the oxidation process, potassium permanganate is converted to manganese oxide, which is biologically harmless. Detoxification is accomplished after about 20-30 minutes of mixing between the two compounds (Prentiss Inc. 1998). Potassium permanganate is routinely added to municipal water supplies for the control of compounds causing taste and odors, and is also used for various applications in fish culture, including use as a control for external parasites and as a bactericide, fungicide, and algaecide (Lay 1971). However, potassium permanganate itself is toxic to fish if concentrations are too high. The toxicity of potassium permanganate to fish ranges from 0.75 to 3.6 mg/L (96-hour LC_{50} values) and is about 1.8 mg/L for rainbow trout. For invertebrates the 96-hour LC_{50} value is 5 mg/L. Because potassium permanganate can be toxic, care must be applied when using it to make sure the rotenone is neutralized, while minimizing the amount of excess potassium permanganate in the water. Surface waters have a potassium permanganate demand based on the amount of organic materials in the water. Successful use of potassium permanganate to detoxify both formulations of rotenone used for this project would be based on balancing the amount of potassium permanganate with the natural chemical demand of the water and the chemical demand caused by the piscicide.

Dead fish would result from this project. Bradbury (1986) reported that approximately 70% of rotenone fish killed in Washington lakes never surface. Parker (1970) reported that at water temperatures of 40°F and less, dead fish required 20-41 days to surface, and although no trout were involved in his study, he did include bluegill (*Lepomis macrochirus),* green sunfish (*Lepomis cyanellus),* orange spotted sunfish (*Lepomis humilis*), white crappie (*Pomoxis annularis),* brown bullhead (*Ictalurus nebulosus),* and black bullhead in the study. The most important factors inhibiting fish from ever surfacing are cool water (<50°F) and deep water (>15 feet). However, since Loon Lake is relatively shallow (mean depth of 5.5 feet) compared to these previous studies, and temperatures in late August/early September may be higher than 50°F, many of the fish in Loon Lake may surface after dying. Bradbury (1986) reported that 9 of 11 water bodies in Washington treated with rotenone experienced an algae bloom shortly after treatment. This is attributed to the input of phosphorus to the water as a result of decaying fish. Bradbury further notes that approximately 70% of the phosphorus content of the fish stock would be released into the lake through bacterial decay. This action stimulates phytoplankton production, then zooplankton production, and starts the lake toward production of food for fish. Therefore, this change in water chemistry is viewed as a benefit to stimulate plankton growth. Any changes or impacts to water quality resulting from decaying fish would be short term and minor.

Comment 2f: The risk that rotenone would enter and be mobile in groundwater is minimal. Rotenone's ability to move through soil is low (Finlayson et al. 2000). Rotenone moves less than 1 inch in most types of soils, except for sandy soils where the movement is slightly more than 3 inches. Rotenone is strongly bound to organic matter in soil, so it is unlikely that rotenone would enter the groundwater (Dawson et al. 1991). Rotenone can be found in lake sediments at similar concentrations as in the water; its breakdown lags behind that of the rotenone in the water by 1-2 weeks (Finlayson et al. 2000). Rotenone in stream sediments is uncommon (CDFG 1994). However, even if groundwater contamination could occur, there would be a low potential for detrimental effects on human health, since the surface water concentrations to be used in this project are shown to have no toxic effect on humans or other animals (see Sections 5 and 8 below). Furthermore, any rotenone that enters groundwater would continue to be diluted by water already present in the aquifer. The chance for exposure of rotenone to ground water is minimal since no domestic wells are nearby.

Comment 2j: Bioassays on mammals indicate that at the proposed concentrations, CFT Legumine and the powdered rotenone formulation would have no effect on mammals, including humans that drink the treated water (Schnick 1974). The studies required for setting tolerances for the use of rotenone in waters intended for irrigation, livestock consumption (except possibly for swine), and recreational swimming use have been completed and suggest that at the proposed concentrations of rotenone that would be used, it would have no effect on mammals (including humans) that drink the treated water. Moreover, rotenone was used for many years to control grubs on the backs of dairy and beef cattle. Regardless, the USEPA has not yet established tolerances for rotenone in potable and irrigation water. As a result, although waters with rotenone present may not cause problems, water containing residues of rotenone cannot be legally allowed for use for domestic or crop use. The degradation process can vary from 1-8 weeks depending on initial concentrations, temperature, and water chemistry. Public recreation within the project area during the time period that CFT Legumine and powdered rotenone would be used is minimal.

Comment 2m: MFWP would apply for an exemption of surface water quality standards from Montana DEQ under Section 308 of the Montana Water Quality Act for the application of the piscicides.

3. <u>AIR</u> **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Emission of air pollutants or deterioration of ambient air quality? (Also see 13c.)			X			3a.
b. Creation of objectionable odors?			X			3b.
c. Alteration of air movement, moisture, or temperature patterns, or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge, which will conflict with federal or state air quality regulations?		X				

Comment 3a: Emissions from outboard motors' exhaust would be created, but are expected to dissipate rapidly. Any impacts from these odors would be short term and minor.

Comment 3b: Liquid-formulated rotenone does contain solvents that make it soluble in water, and although the CFT Legumine formulation contains different solvents than other formulations, CFT Legumine is not completely odorless. The odors that result from these solvents may last for several hours to several days, depending on air and water temperatures and wind direction. Applicators would have the greatest contact with these odors, but would be protected because they would be wearing personal protective equipment, as the product label recommends and as is mandated by the Montana Department of Agriculture. Any impacts caused by objectionable odors would be short term and minor.

Dead fish would result from this project and may cause objectionable odors from decomposition. However, the number of dead fish that surface as a result of this project may be reduced by completing the application during the fall because water temperatures will be cooler, which has been shown to reduce the number of fish that surface after the application of rotenone. Objectionable odors will also be limited due to ice formation on Loon Lake that will likely occur within 10-12 weeks after piscicide application. Therefore, we would expect odors to be short term and minor.

4. <u>VEGETATION</u> **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Changes in the diversity, productivity, or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?		X				
b. Alteration of a plant community?		X				
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				4c.
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?		X				
f. Will the project affect wetlands or prime and unique farmland?		X				

Comment 4c: A documented population of the sensitive plant, water bulrush (*Scirpus subterminalis*), exists in Loon Lake. Water bulrush is classified as a sensitive species on the Kootenai Forest. This plant is globally secure (ranking of G4G5), but has a state ranking of S2 (Imperiled) – "At risk because of very limited and/or declining numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state" (KNF Sensitive Plant Field Guide, March 2005, page xii). In Wyoming and Saskatchewan, water bulrush has a ranking of S1 (Critical). In Oregon, it is ranked S2 (Imperiled), and in Idaho it is ranked S3 (Vulnerable). In British Columbia, the plant is ranked as S4 (Apparently Secure); it is not ranked in Alberta and is under consideration for ranking in Washington. The plant is commonly found in shallow water (1-4 feet) of ponds, lakes, and sloughs. There are 15 documented sites of water bulrush within the state of Montana. Five of these sites are in Lincoln County. All of the documented sites are in western Montana. This project would not affect the population of water bulrush inhabiting Loon Lake. We base this assertion on the fact that the water level in Loon Lake at the time of treatment or over the long term would not be affected by this project, CFT Legumine is not harmful to plants, and motor boat activities associated with the application of the CFT Legumine and associated monitoring would not be substantially different than recreational activities that currently occur at this site.

5. FISH/WILDLIFE **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		Yes	5b.
c. Changes in the diversity or abundance of nongame species?			X		Yes	5c.
d. Introduction of new species into an area?			X		No	5d.
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?	X					5f.
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest, or other human activity)?		X				
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f.)	X					See 5f.
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d.)			X			See 5d.

Comment 5b: This project is designed to kill eastern brook trout and black bullheads. Eastern brook trout are game species that would be eliminated from Loon Lake and the outlet stream. Black bullheads would also be eliminated, but are not classified as a game species in Montana. The impact from the removal of these fish species is expected to be short term and minor because the lake would be restocked with westslope cutthroat trout and would also likely pioneer into the outlet stream and Pipe Creek.

Comment 5c:

Aquatic Invertebrates: Nongame (nontarget) species that would be impacted include zooplankton, some aquatic insects, and possibly some amphibians. Numerous studies indicate that rotenone has temporary or minimal effects on aquatic insects and plankton. Anderson (1970) reported that comparisons between samples of zooplankton taken before and after a rotenone treatment did not change a great deal. Despite the inherent natural fluctuations in zooplankton communities, the application of rotenone had little effect on the zooplankton community. Cook and Moore (1969) reported that the application of rotenone has little lasting effect on the nontarget insect community of a stream. Kiser et al. (1963) reported that 20 of 22 zooplankton species reestablished themselves to pretreatment levels within about 4 months of a rotenone application. Cushing and Olive (1956) reported that the insects in a lake treated with rotenone exhibited only short-lived effects. Hughey (1975) concluded that three Missouri ponds treated with rotenone showed little short-term and no long-term effect on population levels of zooplankton. The effects of rotenone on plankton were consistent with the natural variability that is characteristic of plankton populations, and re-colonization was rapid and reached near pretreatment levels within eight months.

Both Anderson (1970) and Kiser et al. (1963) reported that most zooplankton species survive a rotenone treatment via their highly resilient egg structures. In addition, parthenogenesis of some female plankton occurs, causing sexual dimorphism, which greatly increases plankton density in times of population distress. MFWP expects a similar response from the zooplankton community in Loon Lake following rotenone treatment.

Case studies conducted on Devine Lake in the Bob Marshall Wilderness from 1994-1996 indicate that invertebrates actually increased in number and very slightly increased in diversity following a rotenone treatment (Rumsey et al. 1996). This is supported by observations made by Cushing and Olive (1956), who reported that oligochaetes (worms) increased in number after a rotenone treatment, but later stabilized. *Gammarus* species (fresh water shrimp), a common fish food item, were detected in Devine Lake only when fish were present. Neighboring Ross Lake, in the Bob Marshall Wilderness, is fishless and was used to measure natural insect and plankton variation during the Devine Lake treatment and evaluation. *Gammarus* species were never detected in Ross Lake, although it is fishless. Invertebrate numbers in Ross Lake were reported to be relatively stable, but the diversity of insects fluctuated considerably over time. Therefore, MFWP expects that the impacts to these nontarget organisms within the project area would be short term and minor.

Amphibians: MFWP observed tailed frogs (*Ascaphus truei*) and spotted frogs (*Rana pretiosa*) within the project area. Other amphibian species, which may be present on the project area, include western toads (*Bufo boreas*), long-toed salamanders (*Ambystoma macrodactylum*), and Pacific chorus frogs (*Pseudacris regilla*).

Rotenone is toxic to most gill-breathing larval amphibians, but is not harmful to adults (Schnick 1974). Chandler and Marking (1982) found that southern leopard frog tadpoles were between 3 and 10 times more tolerant than fish to Noxfish (5% rotenone formulation). Grisak et al. (in prep) conducted laboratory studies on long-toed salamanders, tailed frogs, and Columbia spotted frogs and concluded that the adult life stages of these species would not suffer an acute response to rotenone, but the larval and tadpole stages could be affected by rotenone at fish-killing concentrations. These authors recommended implementing rotenone treatments at times when the larvae and tadpoles are not present, such as the late summer/early fall (which is the case in this project), to reduce potential for impacts.

Reptiles: Western terrestrial garter snakes (*Thamnophis elegans*), common garter snakes (*Thamnophis sirtalis*), and racer snakes (*Coluber constrictor*) likely inhabit the project area and are within the known distribution range of the area, as are painted turtles (*Chrysemys picta*), rubber boa snakes (*Charina bottae*), western skinks (*Eumeces skiltonianus*), and northern alligator lizards (*Elgaria coerulea*). However, MFWP has not observed any of these species in the vicinity of the project area. Reptiles are apparently not affected by rotenone treatments (Schnick 1974). The effect of this project on the reptile community is expected to be nonexistent to minor.

Mammals and Birds: The effect of rotenone on birds and mammals has been studied extensively. Mammals in general are not affected because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Laboratory tests fed forms of rotenone to rats and dogs as part of their diet for periods of six months to two years (Marking 1988). Researchers observed effects such as diarrhea, decreased food consumption, and weight loss, and reported that despite unusually high treatment concentrations of rotenone in rats and dogs, it did not cause tumors or reproductive problems in mammals. CDFG (1994) studies of risk for terrestrial animals found that a 22-pound dog would have to drink 7,915 gallons of lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose. The state of Washington reported that a half-pound mammal would need to consume 12.5 mg of pure rotenone to receive a lethal dose (Bradbury 1986). Considering the only conceivable way an animal can consume the compound under field conditions is by drinking lake or stream water, a half pound animal would need to drink 33 gallons of water treated at 2 ppm rotenone. Brooks (1961) reported that this amount is more on the order of 49 gallons. Similar results determined that birds required levels of rotenone at least 1,000 to 10,000 times greater than is required for lethality in fish (Skaar 2001). Cutkomp (1943) reported that chickens, pheasants, and members of lower orders of *Galliformes* were quite resistant to rotenone, and four-day-old chicks were more resistant than adults. Ware (2002) reports that swine are uniquely sensitive to rotenone, and it is slightly toxic to wildfowl, but to kill Japanese quail required 4,500 to 7,000 times more than is used to kill fish. One study, in which rats were injected with rotenone for a period of weeks, reported finding lesions characteristic of Parkinson's disease (Betarbet et al. 2000). However, the results have been challenged on the basis of methodology: (1) that the continuous intravenous injection method used leads to "continuously high levels of the compound in the blood," and (2) that dimethyl sulfoxide (a chemical that some formulations of rotenone contain, but CFT Legumine does not) was used to enhance tissue penetration. Finally, injecting rotenone into the body is not a normal way of assimilating the compound. Similar studies (Marking 1988) have found no Parkinson's-like results. Extensive research has demonstrated that rotenone does not cause birth defects (HRI 1982), gene mutations (Van Geothem et al. 1981; BRL 1982), or cancer (Marking 1988). Spencer and Sing (1982) reported that rats that were fed diets laced with 10-1,000 ppm rotenone over a 10-day period did not suffer any reproductive dysfunction. Rotenone was found to have no direct role in fetal development of rats that were fed excruciatingly high concentrations of rotenone. Typical concentrations of actual rotenone used in fishery management range from 0.025 to 0.50 ppm and are far below that administered during most toxicology studies.

It is important to note that nearly all of these examples presented here involved subjecting laboratory specimens to unusually high concentrations of rotenone or conducting tests on animals that would not be exposed to rotenone during normal use in fisheries management.

Based on this information we would expect the impacts to nontarget mammals and birds to range from nonexistent to short term and minor.

Comment 5d: This project is designed to introduce cutthroat trout into Loon Lake following the removal of the other species specifically for the purposes of improving angling quality and native species conservation. MFWP believes that westslope cutthroat trout were likely the dominant salmonid species historically present in Loon Lake.

Comment 5f: Bald eagles (*Haliaeetus leucocephalus),* grizzly bears (*Ursus arctos horribilis),* Canada lynx (*Lynx Canadensis),* and grey wolves (*Canis lupus)* may also be present within the general vicinity of the project area, but no known nesting or birthing sites are known to occur in the immediate area. The effect of this project on these species is expected to be short term and minor or nonexistent, which would be similar to the effect on other birds and mammals within the area. MFWP based this assessment on the unrealistic volume of treated water and/or fish killed by rotenone that would need to be consumed by any of these species to produce a harmful effect (see Comment 5c above). This project is not likely to have secondary effects, such as displacement, on any of these species. Project personnel activity during project completion may be slightly higher than existing recreational use during the remainder of the summer and fall, but should have no effect on sensitive animal displacement. The fish community in Loon Lake is unlikely to be a substantial food source for any of these sensitive animal species. Therefore removing these fish from Loon Lake would have little or no impact on any of these species.

Bull trout (*Salvelinus confluentus)* are not known to exist in Loon Lake or the outlet tributary upstream of the current falls barrier located approximately one mile upstream of the confluence with Pipe Creek. However, Pipe Creek is an important spawning tributary for fluvial bull trout from the Kootenai River. However, the presence of a natural fish barrier on the Loon Lake outlet stream located approximately 1.0 mile upstream from the confluence with Pipe Creek limits bull trout access past that point. Brook trout have been shown to compete and hybridize with bull trout. MFWP has observed hybrid individuals in Pipe Creek and a substantial decrease in the number of bull trout redds and juveniles in Pipe Creek within the past several years. Loon Lake and the associated outlet stream is a source of brook trout to Pipe Creek, and although other tributaries within the Pipe Creek drainage also harbor brook trout, the removal or substantial reduction of the abundance of brook trout in Loon Lake and the outlet stream may enhance the persistence of bull trout in Pipe Creek. Efforts to detoxify the outlet stream prior to its entering Pipe Creek would ensure that there would be no negative impacts to bull trout as a result of this project. However, if detoxification efforts are inadequate to effectively neutralize all the rotenone in the outlet stream, minor numbers of bull trout and other fish species in Pipe Creek may die despite the dilution that occurs in the lower sections of the outlet stream and within Pipe Creek. MFWP measured the flow of the outlet stream approximately ¼ mile downstream of the lake outlet at 0.7 cfs and at the confluence with Pipe Creek at 3.3 cfs. We also measured the flow of Pipe Creek immediately upstream of the confluence and estimated 19.2 cfs. Measurements were conducted in June 2007, after the spring freshet. We used these discharge estimates to evaluate what rotenone concentrations would be without any detoxification efforts. Therefore, given the targeted treatment concentration of 5 ppm rotenone in Loon Lake, the expected concentration of rotenone at the confluence of the outlet stream with Pipe Creek due to dilution only would be approximately 1 ppm. After complete mixing with Pipe Creek, dilution would reduce the concentration of rotenone in Pipe Creek to approximately 0.2 ppm. MFWP used tracer dye in June 2006 to estimate travel times within the outlet stream, and estimated that the mixing zone within Pipe Creek was approximately 100 yards downstream of the confluence. The discharges of the waters discussed would likely be lower in late summer/early fall. However, the ratios would likely be similar. MFWP would measure discharges at these locations within one week of the rotenone application and throughout the detoxification operation to ensure the accuracy of the calculations for the quantities of rotenone and potassium permanganate required for the project. Efforts to neutralize the rotenone within the outlet stream prior to it entering Pipe Creek would ensure that no bull trout die as a result of this project. Diligent attention to the operation of the detoxification station would ensure that any impacts to bull trout in Pipe Creek as a result of this project are minimal to nonexistent. Potassium permanganate can also be toxic to fish if concentrations are too high (see comment 2a.). MFWP added tracer dye to the outlet stream near the existing barrier in June 2007 in order to estimate water travel time, and found that took approximately 100 minutes for water to flow from the barrier location site to the confluence. Detoxification of rotenone is accomplished after about 20-30 minutes of mixing with potassium permanganate (Prentiss Inc. 1998). Therefore, the positioning of the detoxification station would allow adequate time for the potassium permanganate to completely detoxify the rotenone. Diligent attention to the operation of the detoxification station located at the existing barrier would ensure that potassium permanganate is added at the precise amount needed to neutralize the rotenone, but not high enough to harm aquatic life, including bull trout in Pipe Creek. MFWP conducted a similar project on Kilbrennan Lake in the fall and winter of 2006, during which MFWP operated a similar detoxification station over a period of 129 days without incidence.

B. HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Increases in existing noise levels?		X				
b. Exposure of people to severe or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

7. LAND USE **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflict with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?		X				
d. Adverse effects on or relocation of residences?		X				

8. <u>RISK/HEALTH</u> <u>HAZARDS</u> **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		Yes	8a.
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?			X		Yes	8b.
c. Creation of any human health hazard or potential hazard?			X		Yes	8a and 8c.
d. Will any chemical toxicants be used?			X		Yes	8a.

Comment 8a: There is a minor risk of an unintentional spill of rotenone or potassium permanganate directly into the lake or stream. Rotenone and potassium permanganate are normally diluted in water prior to introduction into a body of water. If undiluted rotenone or potassium permanganate is spilled, or if a drip station tips into the stream, a higher concentration of chemical in the stream would result. This would likely cause a higher mortality of fish and aquatic macroinvertebrates in the area downstream from the spill. Should the concentration of rotenone exceed the ability of the detoxification station's abilities, some fish in the lower section of the outlet stream or Pipe Creek may be killed. There is little chance any rotenone would enter Pipe Creek, but if it does, it is not likely to impact fish due to dilution (see comment 5f. above).

There is a minor risk of a health hazard for project personnel associated with eye or skin contact CFT Legumine. Contact of CFT Legumine with the eyes can cause intense pain and irritation immediately or within several hours following contact. The human health risks are similar for powdered rotenone. Both of these piscicide products have spill contingency requirements on the Manufacturer Safety Data Sheets (MSDS) that would be strictly adhered to. State and federal laws require that both of these products be applied by certified applicators trained to respond to spills and human exposure to these chemicals. Project personnel would be trained in safety procedures and all personnel involved in the application of these chemicals would utilize personal protective equipment to ensure safety. Personnel would use all safety equipment specified on the product labels. This project would also develop an implementation and safety plan to ensure safe application of these chemicals. The risk of exposure of these chemicals to the public would also be minor. Public signs notifying the public of the project would be posted in the area at all access routes, and the two forest access roads would be temporarily closed on the day the piscicides are applied.

Substantial research has been conducted to determine the human health threats of rotenone. From this research it has been concluded that rotenone does not cause birth defects (Hazleton Raltech Laboratories 1982), reproductive dysfunction (Spencer and Sing 1982), gene mutation (Biotech Research 1981; Van Geothem et al. 1981; NAS 1983) or cancer (USEPA 1981b; Tisdel 1985). When used according to label instructions for the control of fish, rotenone poses little, if any, hazard to public health. The USEPA (1981, 1989) has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment. The hazard associated with the short-term exposure to drinking water containing rotenone is very small because of the low concentration of rotenone (0.5 ppm) used in the treatment and the rapid breakdown and dilution of rotenone. Estimates of a single lethal dose to humans are 300-500 mg of rotenone per kilogram (2.2 pounds) of body weight (Gleason et al. 1969). For example, a 160-pound (72.6 kilogram) person would have to drink over 23,000 gallons (87,000 liters) of water treated at 0.25 mg of rotenone per liter of water at one sitting; 0.25 mg of rotenone per liter of water is the highest allowable treatment rate for fish management. A 22-pound (10 kilogram) child would have to drink over 1,429 gallons (5,400 liters). An intake of 0.7 mg of rotenone per kilogram of body weight per day is considered safe (Haley 1978), which is equivalent to about 25 mg per liter when consumed as drinking water; this concentration is far greater than the expected exposure resulting from the maximum fish management treatment rate of 0.25 mg of rotenone per liter of water or our proposed concentration of 0.1 mg per liter. DEQ indicates the safe concentration for short-term human consumption is about 350 mg/l (350 ppm), well over 100 times the application concentration.

Risks to applicators are substantially greater than risks to the general public because of the necessity of handling the compounds at full strength. Measures to reduce risks to applicators include training, proper handling, and the use of safety equipment listed on the product labels such as respirator, goggles, rubber boots, Tyvek overalls, and nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide. At least one, and most likely several, Montana Department of Agriculture certified pesticide applicator(s) would supervise and administer the project. Rotenone and potassium permanganate would be transported, handled, applied, and stored according to the label specifications to reduce the probability of human exposure or spill. Health risk to project personnel would be minimized through the use of proper planning, preparation, and the use of personal protective gear.

MFWP would limit human exposure of the chemicals used for this project by closing the site to public use, collecting dead fish from the site, containing the treatment within the designated zone by detoxifying the piscicides, and posting signs within the project area that indicate no drinking, no swimming, and no eating dead fish.

Fish would not be stocked into Loon Lake until the toxic effects are gone, as indicated on the product labels. MFWP would use caged fish (westslope cutthroat) to determine toxicity. Stocked fish would not accumulate residues of rotenone from the water. Any fish that might survive the treatment won't pose a health threat because the bioaccumulation potential is low and the half-life of rotenone in fish is approximately 1 day (Gingerich and Rach 1985; Gingerich 1986).

CFT Legumine, the commercial formulation of rotenone used for this project, contains volatile organic compounds and semi-volatile organic compounds (Table 1). However, these organic compounds disappear before rotenone dissipates, typically within 1-3 weeks (Finlayson et al. 2000). The volatile organic compounds don't accumulate in the sediment and CFT Legumine has very little naphthalene, which does temporarily accumulate in sediments. As a result of treatment, other materials would not exceed water quality criteria or guidelines set by the USEPA (1980, 1981, 1993).

Table 1. International (CAS), National (EPA-PC) registration codes for the chemicals present in CFT Legumine.			
Chemical Name	**Estimated Concentration**	**CAS#**	**EPA-PC #**
Rotenone (active ingredient)	42.1 µg/L	83-79-4	071003
Rotenolone	5.2 µg/L	none	none
1-Methyl-2-pyrrolidinone (Methyl pyrrolidone)	87.8 µg/L	872-50-4	none
Diethylene glycol monoethyl ether (Diethylene glycol ethyl ether)	581.1 µg/L	111-90-0	011504
1,3,5-Trimethylbenzene (mesitylene)	0.004 µg/L	108-67-8	none
sec-Butylbenzene	0.004 µg/L	135-98-8	none
1-Butylbenzene (n-Butylbenzene)	0.078 µg/L	104-51-8	none
4-Isopropyltoluene (isopropyltoluene)	0.005 µg/L	98-87-6	none
Methylnaphthalene	0.136 µg/L	1321-84-4	054002
Naphthalene	0.341 µg/L	91-20-3	055801

Comment 8b: MFWP has a treatment plan for piscicide projects. This plan addresses many aspects of safety for people who are on the implementation team such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, spill contingency plan, first aid, emergency responder information, personal protective equipment, and monitoring and quality control. Implementing this project should not have any impact on existing emergency plans. The fact that an implementation plan has been developed by MFWP, and that this project would use properly trained personnel, reduces the risk of need for an emergency response. Any effects to existing emergency responders would be short term and minor.

Comment 8c: Although pesticides are used widely to control unwanted species, legitimate public concerns have been raised regarding the safety and health effects to humans. As with any pesticide, direct exposure to, or consumption of, piscicides at full strength can have harmful or sometimes fatal effects on humans (BPA 2004). Rotenone is an EPA-registered pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). There are no federal or Montana numeric water quality standards for rotenone; however, MDEQ (2001) used the EPA method of calculating human health criteria based on noncarcinogenic effects to estimate a safe level for lifelong exposure to water and the consumption of fish exposed to water containing rotenone: 40µg/L water plus fish.

CFT Legumine, the rotenone formulation that would be used for this project, contains five percent active ingredient. When the formulation is applied to achieve 1 mg/L in the water body, the active ingredient concentration is 0.05 mg/L or 50 µg/L. The target concentration would be 10µg/L above the calculated long-term, safe level. But the long-term, safe level was determined using the standard assumption that fish would be exposed to rotenone and be able to bio-concentrate rotenone. This assumption is extremely protective. Rotenone is a natural chemical, but is not naturally found in Montana and is not a chemical likely to be found in fish that are commercially available for consumption. Fish exposed to rotenone at the target concentration would die within two to three hours, thus bio-concentration is very unlikely. Most of the dead fish in the treated lakes would sink to the bottom of the lake. Fish that wash up during the crew's presence at the lake would be collected for disposal. The potential long-term risk to humans with water as their only source of rotenone exposure yields 140μg/L as a safe, long-term concentration. In addition, fish can metabolize non-lethal doses of rotenone, and it does not bioaccumulate.

Since tissue and water concentrations of rotenone decline quickly after treatment, and people would not likely be exposed to treatments on a continual basis, hazardous life-long exposure to rotenone is extremely unlikely. Public health issues surrounding the use of rotenone have been studied extensively. In general, the EPA through FIFRA certification process has concluded that the use of rotenone for fish control does not present a risk of unreasonable, adverse effects to humans and the environment (Finlayson, et al. 2000) as long as the label instructions are followed.

In their description of how South American Indians prepare and apply *Timbó*, a rotenone parent plant, Teixeira et al. (1984) reported that the Indians extensively handled the plants during a mastication process, and then swam in lagoons with the plant pulp on their backs for distribution. No harmful effects were reported.

Finlayson, et al. (2000) reported that the EPA "has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment." In relation to air quality, they further note that "no public health effects from rotenone use as a piscicide have been reported." The reentry statement on the Prenfish label states that swimmers must not enter until the piscicide is thoroughly mixed.

The major risks to human health from rotenone come from accidental exposure during application. This is the only time when humans are exposed to concentrations that are greater than that needed to remove fish. To prevent accidental exposure to liquid-formulated rotenone, the Montana Department of Agriculture requires applicators to:

- Be trained and certified to apply the pesticide in use.
- Be equipped with the proper safety gear, which, in this case, includes fitted respirator, eye protection, rubberized gloves, hazardous material suit.
- Have product labels with them during use.
- Contain materials only in approved containers that are properly labeled.
- Adhere to the product label requirements for storage, handling, and application.

Any threats to human health during application could be greatly reduced with proper application and use of safety equipment. Recreationists in the area would likely not be exposed to the treatments because temporary trail closures would preclude many from being in the area. Proper warning through news releases, signing around the lake, and administrative personnel in the project area should be adequate to keep unintended recreationists from being exposed to any treated waters. Administering application in the late summer or early fall of the year would further reduce exposure due to the relatively low number of users in this area during this time.

9. COMMUNITY IMPACT **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. PUBLIC SERVICES/TAXES/UTILITIES **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify:		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources?		X				
f. Define projected maintenance costs?		X				

11. AESTHETICS/RECREATION **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings?			X			See 11c.
d. Will any designated or proposed wild or scenic rivers, trails, or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11c: This project is intended to improve angling quality in Loon Lake, which may result in an increase of recreational activities over present levels. Angler use of the lake has also declined within recent years. In 1991, MFWP estimated that Loon Lake received 490 angler-days per year, but in 2003, angling pressure on Loon Lake dropped to 82 angler-days per year. The decrease in angler use was presumably due to decrease in angling quality. The benefits of increased recreational use would outweigh any potential impacts associated with the treatment. Any impacts to aesthetics would be short term and minor and be directly associated with the actual rotenone treatment and immediate aftermath, including dead fish in the project area. No tourism report is necessary to quantify these impacts. Access to the Loon Lake area would be blocked during the application of rotenone. It is likely that this would occur during big game archery season, but the impact to hunters would be minor because closure would be for only 1 to 2 weekdays. Signs would be posted warning people not to use the water for domestic purposes or to swim in Loon Lake immediately following the application of rotenone.

12. CULTURAL/HISTORICAL RESOURCES **Will the proposed action result in:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Destruction or alteration of any site, structure or object of prehistoric, historic, or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				
d. Will the project affect historic or cultural resources?		X				

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources that create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects that are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local,		X				

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	**Impact Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
state, or federal law, regulation, standard, or formal plan?						
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?	X				Yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)	X					13f
g. List any federal or state permits required.						13g

Comments 13e and f: The use of pesticides can generate controversy from some people. Public outreach and information programs can educate the public on the use of pesticides. MFWP has a long history of using rotenone for fisheries management in northwest Montana. It is not known if this project would have organized opposition. One reason that MFWP is considering this course of action is based on public reports that angling quality in Loon Lake is low. This project would serve to reverse that condition.

Comment 13g: The following permits would be required:

1. MT DEQ 308 - Department of Environmental Quality (authorization for short-term exemption of surface water quality standards for the purpose of applying a fish toxicant).

PART III. ALTERNATIVES

Alternative 1 – No Action

The no-action alternative would allow status quo management to continue, which would maintain the low quality angling in Loon Lake. Westslope cutthroat trout would not be present in Loon Lake or the portion of the outlet stream upstream of the existing natural barrier. The dominant fish species present in Loon Lake would continue to be eastern brook trout and black bullheads for many years. Implementation of this alternative would do little to conserve bull trout in the Pipe Creek drainage.

Alternative 2 – Rotenone treatment and restocking with westslope cutthroat trout (Proposed Action)

The proposed action involves removing black bullheads and eastern brook trout from Loon Lake and a segment of outlet stream downstream to the existing barrier using the piscicide rotenone in the commercial formulation CFT Legumine and dry powdered form. Afterward the lake would be stocked with westslope cutthroat trout. This alternative would restore a native fish species to part of its historic range, improve angling opportunities in Loon Lake, and may also help increase the likelihood of the persistence of bull trout in Pipe Creek. MFWP believes that this alternative has the highest probability of meeting project objectives. MFWP treated Kilbrennan Lake in the fall of 2006 using a similar approach and achieved a complete removal of black bullheads and nearly eradicated brook trout.

Alternative 3 – Mechanical Removal

This alternative would involve using gillnets and/or trap nets to remove black bullheads and eastern brook trout, then stocking westslope cutthroat trout to improve angling quality. We searched the scientific literature and we were able to find only two examples where mechanical removal was successful at removing a single species of fish from lakes.

Gillnetting has been used successfully to remove unwanted fish from lakes. Bighorn Lake, a 5.2-acre lake located in Banff National Park in Alberta, Canada, was gillnetted from 1997 to 2000 to remove an unwanted population of brook trout (Parker et al. 2001). Over 10,000 net nights (1 net night = 1 net set overnight for at least 12 hours) were conducted over a 4-year period in Bighorn Lake to remove the population, which totaled 261 fish. The researchers concluded that the removal of nonnative trout using gillnets was impractical for larger lakes (> 5 acres) such as Loon Lake. In clear lakes, trout have the ability to become acclimated to the presence of gillnets and to avoid them. These researchers reported observing brook trout avoiding gillnets within about 2 hours of being set. It is not known how black bullhead and brook trout would respond to gillnetting intended for complete removal.

Knapp and Matthews (1998) reported that Maul Lake, a 3.9-acre lake in the Inyo National Forest in California, was gillnetted from 1992 to 1994 to remove a population of brook trout. The population, which totaled 97 fish, was successfully removed with an effort of 108 net days. The researchers reported that following the removal of brook trout from Maul Lake, it was mistakenly restocked with rainbow trout. Efforts to remove them using gillnets were implemented immediately. From 1994 through 1997, 4,562 net days were required to remove the 477 rainbow trout from the lake. These researchers reported that gillnets could be used as a viable alternative to chemical treatment. They acknowledged that the small size and shallow depth of Maul Lake leant itself to a successful fish eradication using gillnets. Their criteria for successful fish removal using gillnets include lakes less than 3.9 surface acres, less than 19 feet deep, with little or no inflow or outflow to perpetuate reinvasion, and no natural reproduction. Although not tested, the maximum size of a lake that they felt could be depopulated using gillnets was 7.4 surface acres and 32 feet deep.

No information was found that described the probability of success with using gillnets or trap nets to completely remove the two nonnative species from a lake. However, both of the examples presented above were successful at eradicating a single species from those individual lakes because they were relatively small and shallow, and these lakes contained species of fish susceptible to capture via nets and traps. This is not the case with Loon Lake, which is larger and deeper than recommended by the authors in the successful examples above, and contains black bullheads which have an affinity for remaining near the bottom and in shallow habitats, which MFWP believes will make them difficult to achieve a sufficiently high trap efficiency to achieve project objectives.

Brook trout also exist in the outlet stream from Loon Lake. The use of nets or traps in the creeks would not be an effective method of capturing fish in the creek due to extremely dense riparian vegetation and high habitat complexity. Similarly, electrofishing the outlet stream would not be feasible for the same reasons. In addition, there would be an incredible time commitment required to attempt either method of removal. Due to these considerations and expected incomplete results, this alternative has a low probability of meeting the objectives.

Therefore, based on acclimation to the presence of the nets, the relative size and depth of Loon Lake (33 acres, 172 acre feet in volume), the presence of black bullheads and the unknown capture efficiency using traps and nets, the extremely labor intensive requirements to conduct the trapping/netting operation, and the high abundance of brook trout in the outlet stream, it seems highly unlikely that mechanical removal methods using traps, netting, or electrofishing would achieve project objectives.

Alternative 4 – Stocking the lake with westslope cutthroat trout

This alternative involves stocking the lakes with cutthroat trout in the presence of black bullheads and eastern brook trout. MFWP expects this alternative would do little to increase the long-term numbers of trout species present in Loon Lake. For example, MFWP stocked approximately 2,000 juvenile rainbow trout in Loon Lake in 1989, 1991, 1994, and 1996, yet no rainbow trout have been seen in recent sampling efforts. While this alternative may increase numbers of trout over the short term, competition between species would likely limit the long-term success of stocking westslope cutthroat in the presence of the other nonnative species. This alternative would likely not reduce the numbers of eastern brook trout in the outlet stream and may have the potential of displacing a higher number of brook trout into Pipe Creek. Based on these considerations, this alternative has a low probability of meeting the objectives.

PART IV. EA CONCLUSION SECTION

1. **Based on the significance criteria evaluated in this EA, is an EIS required (YES/NO)? If an EIS is not required, explain why the EA is the appropriate level of analysis for this proposed action.**

   MFWP concludes that an EIS is not required for the implementation of this project. MFWP further concludes from the information presented in this document that the proposed activities will have either no impact or a positive impact on the physical and human environment.

2. **Describe the level of public involvement for this project, if any, and given the complexity and the seriousness of the environmental issues associated with the proposed action, is the level of public involvement appropriate under the circumstances?**

   The draft environmental assessment (EA) is being distributed to all individuals and groups listed in the cover letter. The EA will be placed on the MFWP web site. A public meeting will be held on Thursday, August 16, 2007, at 6 p.m. in the upstairs meeting room at the First National Bank in Libby located at 504 Mineral Avenue. Contact Jim Dunnigan at (406) 293-4161 ext. 100 for more information.

3. **Duration of comment period, if any:**

   There will be a 30-day public comment period for this environmental assessment. Comments will be accepted through Friday, August 31, 2007. Submit comments to: Montana Fish, Wildlife & Parks, Attention: Jim Dunnigan, 475 Fish Hatchery Road, Libby, MT 59923, or e-mail to jdunnigan@mt.gov.

4. **Name, title, address and phone number of the person(s) responsible for preparing the EA:** Jim Dunnigan, Fisheries Biologist, MFWP, 475 Fish Hatchery Road, Libby, MT 59923, (406) 293-4161.

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